

Research Review

Stanford Research Institute Problem Solver – STRIPS

Referred to as the “first electric person”¹, the Shaky Robot integrated a state-of-the-art planning component developed by Nils Nelson and Richard Fikes. Considered the first motion planning system², STRIPS used means-end analysis to search through a state-space, where world-models are searched through that bring the initial state to the end goal³.

STRIPS led to advancements specifically in robotics which deals with real-world problem solving. In other words, the positions of objects and the robot as a state can’t be represented with a simple matrix or list structure like in a game⁴. So to reconcile this complexity, STRIPS used separate action routines and theorem-proving methods to search through a space of world models.

WARPLAN

A successful planner must be able to interleave different subplans to avoid conflicts between subgoals⁵. WARPLAN was the first planner to tackle this in a logic programming language using goal-regression planning. Meanwhile, this legitimized logic programming as a tool for A.I. research. This was important, and still is, because a lot of research is done with linear programming when there may be more efficient solutions out there, such as this⁶.

UnPOP

As state-space planning was wanning in the nineties, Drew McDermott’s UnPOP program used a unique heuristic that surmounted the current attention towards partial-order planning⁷. UnPOP’s success made the case for heuristic distance as a viable option in planning. McDermott’s heuristic, namely Ignoring Delete Lists, makes a few assumptions that lend to efficiency. These include assuming the negative effects of the available planning operators (delete lists) are empty⁸. UnPOP’s use of ignore-delete-lists set a precedent for A.I. in that it proved heuristic useful in addressing problems with planning and search.

¹ <https://www.sri.com/work/timeline-innovation/timeline.php?timeline=computing-digital#!&innovation=shakey-the-robot>

² Sterling, Bruce. “Dead Media Beat: Early Artificial Intelligence Projects.” *Wired*, Conde Nast, 12 Oct. 2012, www.wired.com/2012/10/dead-media-beat-early-artificial-intelligence-projects/.

³ “Artificial Intelligence Planning with STRIPS, A Gentle Introduction.” *Primary Objects*, 14 Jan. 2017, www.primaryobjects.com/2015/11/06/artificial-intelligence-planning-with-strips-a-gentle-introduction/.

⁴ Fikes, Richard E., and Nils J. Nilsson. “Strips: A New Approach to the Application of Theorem Proving to Problem Solving.” *Artificial Intelligence*, vol. 2, no. 3-4, 1971, pp. 189–208., doi:10.1016/0004-3702(71)90010-5.

⁵ RUSSELL, STUART NORVIG PETER. *ARTIFICIAL INTELLIGENCE: a Modern Approach*. PEARSON, 2018.

⁶ http://www.cogsys.wiai.uni-bamberg.de/teaching/ws0405/s_planning/slides/Introduction_AI_Planning_Folien.pdf

⁷ http://ai.cs.unibas.ch/research/reading_group/mcdermott-aips1996.pdf

⁸ <https://www.aaai.org/Papers/JAIR/Vol24/JAIR-2418.pdf>

